Volunteer Lake Assessment Program Individual Lake Reports
HAUNTED LAKE, FRANCESTOWN, NH

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

MORPHOMETRIC DATA

Watershed Area (Ac.):	3,776	Max. Depth (m):	5.2	Flushing Rate (yr⁻¹)	5.4	
Surface Area (Ac.):	171	Mean Depth (m):	2.4	P Retention Coef:	0.52	
Shore Length (m):	3,400	Volume (m³):	1,361,500	Elevation (ft):	636	

TROPHIC CLASSIFICATION

Year	Trophic class
1980	EUTROPHIC
2002	MESOTROPHIC

KNOWN EXOTIC SPECIES

Variable Milfoil

The Waterbody Report Card tables are generated from the DRAFT 2014 305(b) report on the status of N.H. waters, and are based on data collected from 2004-2013. Detailed waterbody assessment and report card information can be found at www.des.nh.gov/organizations/divisions/water/wmb/swqa/index.htm
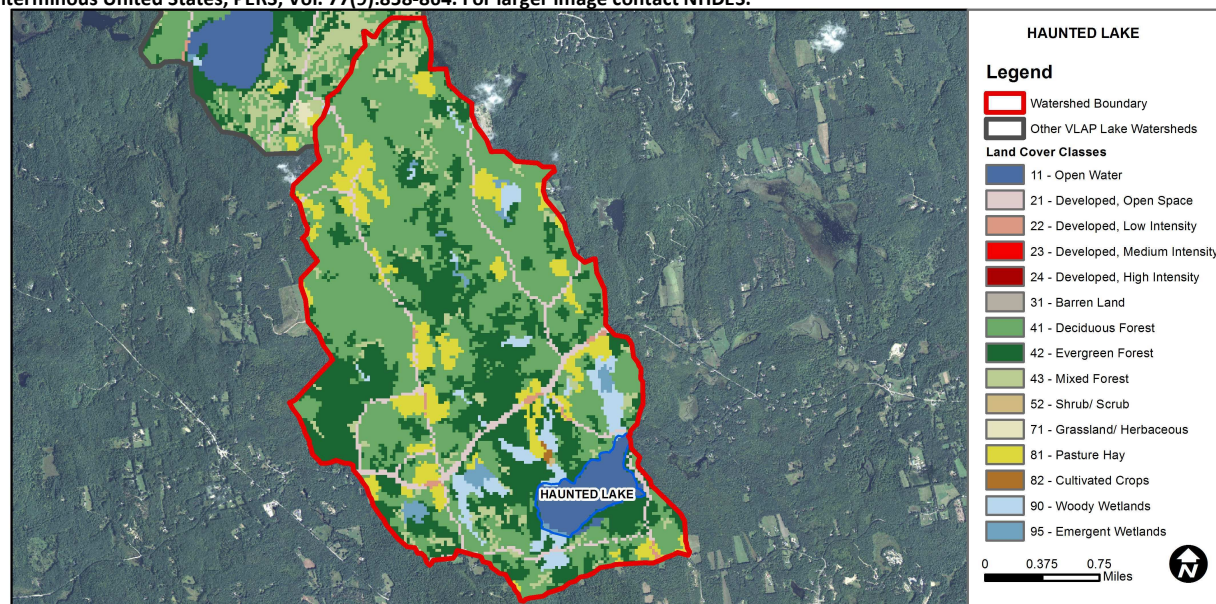
Designated Use	Parameter	Category	Comments
Aquatic Life	Phosphorus (Total)	Slightly Bad	The calculated median is from 5 or more samples and is > indicator and the chlorophyll a indicator is exceeded.
	pH	Slightly Bad	>10% of samples exceed criteria by a small margin (minimum of 2 exceedances).
	Oxygen, Dissolved	Encouraging	There are < 10 samples with 0 exceedances of criteria. More data needed.
	Dissolved oxygen satura	Cautionary	There are < 10 samples with 1 exceedance of criteria. More data needed.
	Chlorophyll-a	Slightly Bad	The calculated median is from 5 or more samples and is > indicator.
Primary Contact Recreation	Escherichia coli	Encouraging	There are no geometric means or there are > 2 single samples but those samples are within 75% of the geometric means criteria. More data needed.
	Chlorophyll-a	Good	There are at least 10 samples with one, but < 10% of samples, exceeding indicator.

BEACH PRIMARY CONTACT ASSESSMENT STATUS

HAUNTED LAKE - TOWN BEACH	Escherichia coli	Very Good	Where there are no geometric means, all bacteria samples are < 75% of the geometric mean. Where there are geometric means all single bacteria samples are < the SSMC and all geometric means are < geometric mean criteria.

WATERSHED LAND USE SUMMARY

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. Completion of the 2006 National Land Cover Database for the Conterminous United States, PERS, Vol. 77(9):858-864. For larger image contact NHDES.

HAUNTED LAKE

Legend
- Watershed Boundary
- Other VLAP Lake Watersheds

Land Cover Classes
- 11 - Open Water
- 21 - Developed, Open Space
- 22 - Developed, Low Intensity
- 23 - Developed, Medium Intensity
- 24 - Developed, High Intensity
- 31 - Barren Land
- 41 - Deciduous Forest
- 42 - Evergreen Forest
- 43 - Mixed Forest
- 52 - Shrub/ Scrub
- 71 - Grassland/ Herbaceous
- 81 - Pasture Hay
- 82 - Cultivated Crops
- 90 - Woody Wetlands
- 95 - Emergent Wetlands

0   0.375   0.75 Miles

Land Cover Category	% Cover	Land Cover Category	% Cover	Land Cover Category	% Cover
Open Water	3.69	Barren Land	0	Grassland/Herbaceous	0
Developed-Open Space	4.14	Deciduous Forest	46.64	Pasture Hay	8.59
Developed-Low Intensity	0.39	Evergreen Forest	27.26	Cultivated Crops	0.09
Developed-Medium Intensity	0	Mixed Forest	3.98	Woody Wetlands	3.98
Developed-High Intensity	0	Shrub-Scrub	0.03	Emergent Wetlands	1.24

OBSERVATIONS AND RECOMMENDATIONS (*Refer to Table 1 and Historical Deep Spot Data Graphics*)

◆ **CHLOROPHYLL-A:** Chlorophyll levels were elevated, increased from July to September, and were greater than the state median. Average chlorophyll levels decreased from the spike measured in 2013, however chlorophyll levels have spiked to potential bloom levels every other year since 2009. Historical trend analysis indicates moderately variable chlorophyll since monitoring began.

◆ **CONDUCTIVITY/CHLORIDE:** Deep spot and tributary conductivity levels were average for most lakes and only slightly greater than the state median. Historical trend analysis indicates relatively stable epilimnetic (upper water layer) conductivity with moderate variability between years.

◆ **TOTAL PHOSPHORUS:** Epilimnetic phosphorus levels were average in July and elevated in September, while hypolimnetic (lower water layer) phosphorus levels were elevated in July and average in September. Average epilimnetic phosphorus decreased from 2013 but remained greater than the state median. Historical trend analysis indicates relatively stable epilimnetic phosphorus since monitoring began. Inlet and Outlet phosphorus levels were within an average range for those stations and increased slightly in September.

◆ **TRANSPARENCY:** Transparency measured without the viewscope (NVS) was low and much less (worse) than the state median; however transparency measured with the viewscope (VS) improved but still remained less than the state median. Historical trend analysis indicates highly variable transparency since monitoring began.

◆ **TURBIDITY:** Deep spot and tributary turbidities were elevated in July and September and above average for those stations. Prior to the July sampling event, significant rainfall occurred and associated stormwater runoff could have contributed to elevated turbidity. In September, algal growth had increased, pond level and Inlet flow was low and could have contributed to elevated turbidity.

◆ **PH:** Epilimnetic pH was within the desirable range 6.5—8.0 units, however hypolimnetic pH was less than desirable in June. Historical trend analysis indicates stable epilimnetic pH since monitoring began.

◆ **RECOMMENDED ACTIONS:** The variable and elevated phosphorus and chlorophyll levels are concerning. Increasing monitoring frequency to three times per summer, typically June, July and August will help to assess the variability and identify potential sources of the elevated phosphorus. Those could include but are not limited to, stormwater runoff, Variable milfoil treatment, and motor boat activities, and aging septic systems. The increased frequency and intensity of storm events highlights the importance of managing stormwater runoff in the watershed. Stormwater runoff can transport sediments, nutrients and other pollutants to the pond. Lake residents should utilize DES' " NH Homeowner's Guide to Stormwater Management" to help identify and implement best management practices to reduce stormwater runoff from their properties. Local road agents should identify potential areas of erosion and sedimentation along dirt and gravel roads near the pond and implement ways to reduce stormwater erosion. Keep up the great work!

Station Name	Table 1. 2014 Average Water Quality Data for HAUNTED LAKE							
	Alk. mg/l	Chlor-a ug/l	Cond. uS/cm	Total P ug/l	Trans. m		Turb. ntu	pH
					NVS	VS		
Epilimnion	7.55	6.93	68.4	17	1.34	2.03	2.19	6.79
Hypolimnion			71.0	18			4.26	6.37
Inlet			70.2	14			1.84	6.67
Outlet			68.9	15			2.04	6.78

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.
Alkalinity: 4.9 mg/L
Chlorophyll-a: 4.58 mg/m^3
Conductivity: 40.0 uS/cm
Chloride: 4 mg/L
Total Phosphorus: 12 ug/L
Transparency: 3.2 m
pH: 6.6

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.
Chloride: > 230 mg/L (chronic)
E. coli: > 88 cts/100 mL – public beach
E. coli: > 406 cts/100 mL – surface waters
Turbidity: > 10 NTU above natural level
pH: between 6.5-8.0 (unless naturally occurring)

HISTORICAL WATER QUALITY TREND ANALYSIS

Parameter	Trend	Explanation	Parameter	Trend	Explanation
Conductivity	Stable	Trend not significant; data moderately variable.	Chlorophyll-a	Stable	Trend not significant; data moderately variable.
pH (epilimnion)	Stable	Trend not significant; data show low variability.	Transparency	Stable	Trend not significant; data highly variable.
			Phosphorus (epilimnion)	Stable	Trend not significant; data show low variability.

Historical Trend Epilimnetic Conductivity and pH

Historical Deep Spot Chlorophyll-a, Epilimnetic Total Phosphorus & Transparency Data